

Total No. of Questions : 7]

SEAT No. :

P-2606

[Total No. of Pages : 3

[6071]-111

M.Sc. (Part - I)

ELECTRONIC SCIENCE

ELUT-111 : Mathematical Methods in Electronics Using C.

(2019 Pattern) (Semester - I) (Credit - 4)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Questions 2 to 7 carry equal marks.

Q1) Solve any five of the following :

[10]

- a) What is mean by partial differential equation? Give example of PDE in electronics.
- b) What are the different types of differential equations? Classify & give example of each.
- c) Obtain the Laplace transform of the  $e^{-3t} \cos 5u(t)$  function.
- d) Explain fgetc( ) function with suitable example.
- e) Give the difference between “Call By Value” and “Call By reference”.
- f) What are the various data types in C.

Q2) Attempt the following :

- a) i) Examine the stability of given equation using Routh Hurwitz method.  $s^3 + 4s^2 + s + 6 = 0$ . [4]
- ii) Show that Laplace transform of  $f'(t) = Sf(s) - f(0)$ . Find the laplace Transform of  $f(t) = A.e^{-at}$ . [3]
- b) Using the method of separation of variables, separate the variables of Laplace equation in spherical co-ordinate system. [5]

P.T.O.

**Q3)** Attempt the following :

- a) i) Draw the block diagram of two port Network. Define voltage, current transfer impedance and admittance function. [4]
- ii) The co-ordinates of points in cylindrical coordinates  $\left(4, \frac{2\pi}{3}, -2\right)$ . Determine co-ordinates in rectangular co-ordinates. [3]
- b) State convolution theorem. Determine the Laplace Transform of  $\frac{1}{s^3(s-5)}$  using convolution theorem. [5]

**Q4)** Attempt the following :

- a) i) Explain loop statements in C. [4]
- ii) Write a C program to find quadratic equation. [3]
- b) Define Z-transform, Inverse Z-transform & Region of convergence. Determine Z-transform of  $x(t) = e^{-at}$ . [5]

**Q5)** Attempt the following :

- a) i) State initial value & final value theorem. Using initial value theorem, find the value of  $F(s) = \frac{s+1}{s+2}$ . [4]
- ii) Draw poles & zeros for the current I(s) in the network given by  $I(s) = \frac{2s+1}{(s+2)(s+1)}$ . [3]
- b) Explain the concept of pointer. Write a program to reverse a string using pointer. [5]

**Q6)** Attempt the following :

- a) What are the advantages of state variable approach over transfer function approach? Find the transfer function low pass passive RC filter. [7]
- b) Write a wave equation in cylindrical co-ordinate system. Separate the variables. [5]

**Q7)** Attempt any two of the following :

- a) Write a short note on : **[6]**
  - i) Ordinary differential equation.
  - ii) Homogenous Differential equation.
  - iii) Non-Homogenous Differential equation.
- b) Explain storage class in C, with suitable examples. **[6]**
- c) Write a short note on : **[6]**
  - i) Unit Impulse signal
  - ii) Ramp signal
  - iii) Unit step signal



Total No. of Questions : 7]

SEAT No. :

**P2607**

[Total No. of Pages : 3

[6071]-112

**M.Sc.-I**

**ELECTRONIC SCIENCE**

**ELUT-112 : Analog Circuit Design  
(CBCS 2019 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 70*

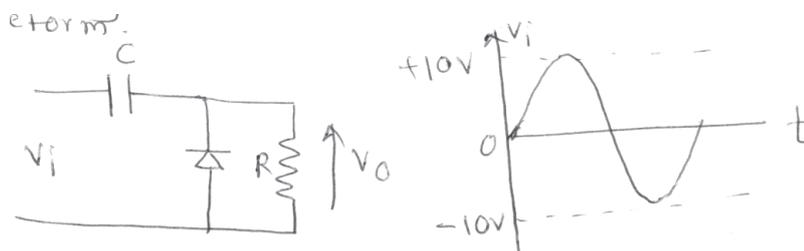
*Instructions to the candidates:*

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to Q.7 carry equal marks.*

**Q1)** Attempt any five of the following:

**[10]**

- a) When reverse gate voltage of JFET changes from 4 to 3.vv, the drain current changes from 1.3 to 1.6 MA. Find the value of transconductance.
- b) Identify the following circuit & draw output waveform.

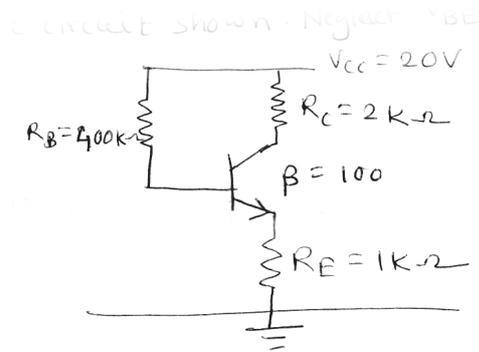


- c) What are the advantages of “re” model of transistor?
- d) What is harmonic distortion in amplifier?
- e) What is difference in double tuned implifier and stagger tuned amplifier?
- f) For inverting amplifier  $R_1=470\Omega$ ,  $R_F=4.7K\Omega$ , calculate the values of  $A_F$  (Voltage gain) & Input resistance.

**P.T.O.**

Q2) Attempt the following:

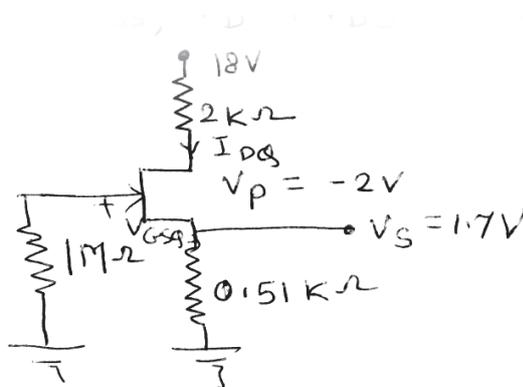
- a) i) Discuss in detail about Miller's theorem and its dual. [3]  
 ii) Calculate the dc bias voltage and currents in the circuit shown. Neglect  $V_{BE}$  of transistor. [4]



- b) Explain the working of second order low pass Butterworth filter with neat circuit diagram and design it for  $f_H = 1KHz$ . [5]

Q3) Attempt the following:

- a) i) Explain the application of PLL as frequency multiplier. [3]  
 ii) Explain the working of Class C tuned amplifier with input-output wave forms. [4]
- b) For a circuit Shown, Find the values :  $I_{DQ}$ ,  $V_{GSQ}$ ,  $I_{DSS}$ ,  $V_D$  &  $V_{DS}$ . Given  $V_S = 1.7V$ . [5]



**Q4)** Attempt the following:

- a) i) Determine the forward resistance of diode when the forward current is 5mA at  $T=300\text{K}$ , Assume silicon diode. [3]
- ii) Explain the working of practical differentiator. What are the designing steps of differentiator? [4]
- b) Explain the working of stagger tuned amplifier. [5]

**Q5)** Attempt the following:

- a) i) What is Hartley oscillator? Explain the working with neat circuit diagram. [3]
- ii) What is clamper? Explain the working of +ve clamper. [4]
- b) Explain the approximate common emitter hybrid model & determine input impedance & Voltage gain using approximate model. [5]

**Q6)** Attempt the following:

- a) i) Design a high pass filter with cut off frequency 1 KHZ and a pass band gain of 2. [3]
- ii) Describe the construction of phase shift oscillator and explain its working. [4]
- b) Explain the working of RC coupled amplifier. What are advantages and disadvantages of two stage RC coupled amplifier? [5]

**Q7)** Write short note on any two of the following: [12]

- a) Distortion in amplifier.
- b) Crystal oscillator.
- c) Instrumentation amplifier.



Total No. of Questions : 7]

SEAT No. :

P-2608

[Total No. of Pages : 2

[6071]-113

M.Sc.

ELECTRONICS SCIENCE

ELUT - 113 : Digital System Design

(2019 Pattern) (Semester - I) (Paper-III) (Credits-4) (CBCS)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Question 1 is compulsory
- 2) Solve any five questions from Q2 to Q7.
- 3) Q.2 to Q.7 carry equal marks.

Q1) Solve any five of the following.

[10]

- a) Write basic modelling styles in verilog.
- b) Give the difference between truth table and excitation table.
- c) What is mean by simulation?
- d) Using assign statement, Write logical expression for two input AND and OR gate.
- e) Mention the various types of PLDs.
- f) What is FSM?

Q2) Attempt the following:

- a) i) Design 3-bit gray to binary code converter. [3]
- ii) Implement the following Boolean expression using PAL,  
 $F_1 = \sum_M(3,5,7)$  and  $F_2 = \sum_M(4,5,7)$  . [4]
- b) Using half subtractor module implement a full subtractor and write verilog module for it. [5]

P.T.O.

**Q3)** Attempt the following.

- a) i) Write the difference between \$monitor and \$display. [3]
- ii) Write Verilog module of D-FF with synchronous reset. [4]
- b) With the help of block diagram, truth table explain Johnson Counter Also Write any two applications of it. [5]

**Q4)** Attempt the following.

- a) i) Draw and explain in short the architecture of typical FPGA. [3]
- ii) Explain any four data types in verilog with suitable example. [4]
- b) Write verilog code for displaying count on common cathode seven segment display for one digit BCD counter. [5]

**Q5)** Attempt the following.

- a) i) Design 4 to 2 priority encoder. [3]
- ii) State the advantages of using PLD over fixed function ICs. List various types of PLDs. [4]
- b) Explain 4-bit universal shift register. [5]

**Q6)** Attempt the following.

- a) i) Give the classification of semiconductor memory, State their types and characteristics. [3]
- ii) Write a verilog code for clocked RS Flip-flop with test bench. [4]
- b) Explain five gate premitives. [5]

**Q7)** Attempt the following (any two) [12]

- a) With the appropriate block diagram explain components of a verilog module.
- b) Write a verilog code for J.K. flip flop using behavioural modelling. draw the test bench waveform for the same.
- c) Write four features of typical CPLD. List the different CPLD devices.



Total No. of Questions : 5]

SEAT No. :

P-2609

[Total No. of Pages : 4

[6071]-114

M.Sc. (Part - I)

ELECTRONIC SCIENCE

ELDT114 : Basics of Optical Communication

(2019 Pattern) (Semester - I) (2 Credits)

*Time : 2 Hours]*

*[Max. Marks : 35*

*Instructions to the candidates:*

- 1) *Q.1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Q.2 to Q.5 carry equal marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of calculator is allowed.*

**Q1)** Attempt any five of the following.

**[5]**

- a) State the snell's law.
- b) State the types of losses in fiber.
- c) State different splicing technique.
- d) What are major fiber joints?
- e) Classify fiber optic based on index profile.
- f) List the factor due to which connector losses occur.

**Q2)** Answer the following.

- a) i) What do you mean by total internal reflection state condition to obtain TIR. **[2]**
- ii) Explain the reasons for pulse broadening due to material dispersion in optical fibers. **[4]**
- b) What is fiber splice? State types of fiber splice, explain any one splicing method in detail. **[4]**

**P.T.O.**

**Q3)** Answer the following.

- a) i) State advantages and disadvantages of fiber optic communication. [2]
- ii) Briefly explain the problem of fresnel reflection at all types of optical fiber joint. [4]
- b) When the mean optical power launched into an 8 km length of fiber is  $120 \mu\text{w}$ , the mean optical power at the fiber output is  $3\mu\text{w}$ . Calculate signal attenuation in  $d_b$  per unit (Km) length. [4]

**Q4)** Answer the following.

- a) i) Compare between meridional ray and skew ray. [2]
- ii) With neat diagram explain the term acceptance angle and acceptance cone indicating reflected ray and lost ray. [4]
- b) Briefly outline the factors which cause intrinsic losses of fiber-fiber joints. [4]

**Q5)** Write short note on any four of the following. [10]

- a) Explain micro and macro bending loss in fiber cable.
- b) Write a short note on fiber buffering.
- c) What is optical repeater? Explain regenerative repeater.
- d) Explain LASER driver circuit.
- e) Write a short note on cylindrical Ferrule connectors.
- f) List the types of misalignment which may occur when jointing compatible optical fibers.



Total No. of Questions : 5]

**P-2609**

**[6071]-114**

**M.Sc. (Part - I)**

**ELECTRONIC SCIENCE**

**ELDT114 : Fundamentals and Applications of PIC**

**Microcontrollers**

**(2019 Pattern) (Semester - I) (Paper - IV) (CBCS-2Credits)**

*Time : 2 Hours]*

*[Max. Marks : 35*

*Instructions to the candidates:*

- 1) *Q.1 is compulsory.*
- 2) *Attempt any 3 questions from Q.2 to Q.5.*
- 3) *Q.2 to Q.5 carry equal marks.*

**Q1)** Attempt any five of the following. **[5]**

- a) What is the role of TRISx register?
- b) What is addressing mode?
- c) Give the applications of PIC microcontroller.
- d) List the instructions for clear operation.
- e) What is the use of RAM in microcontroller?
- f) Give the size of timers in PIC.

**Q2)** Attempt the following.

- a) Explain MOVLW, ADDLW and ANDWF instructions with the help of examples. **[6]**
- b) Write a note on RISC architecture. **[4]**

**Q3)** Attempt the following.

- a) Draw the interfacing diagram of LCD with PIC. Write PIC C program to display 'A' on LCD. **[6]**
- b) What is interrupt? Give the difference between polling and interrupt.[4]

**Q4)** Attempt the following.

- a) Explain any three instructions of control operations with the help of examples. [6]
- b) Explain 8-bit format of Timer 0 control register. (OPTION-REG).[4]

**Q5)** Attempt any four of the following. [10]

- a) Draw the interfacing diagram of common cathode SSD with PIC.
- b) Draw the block diagram of Timer 0 without WDT.
- c) Write any 5 features of PIC.
- d) Give the difference between microcontroller and microprocessor.
- e) Give the size and range of Timer 0 and Timer 1 registers.
- f) Write an assembly language program to toggle PORTB continuously. (without delay)



Total No. of Questions : 7]

SEAT No. :

**P2610**

[Total No. of Pages : 2

[6071]-211

**M.Sc.-I**

**ELECTRONIC SCIENCE**

**ELUT - 121 : Applied Electromagnetics, Microwaves and Antennas  
(2019 Pattern) (Semester-II) (Paper-I) (Credit-4)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to Q.7 carry equal marks.*

**Q1)** Solve any five of the following.

**[10]**

- a) Write the electric and magnetic field wave equation for conducting medium.
- b) What is VSWR?
- c) Find the reflection coefficient of a transmission line having line impedance  $100 \Omega$  terminated in  $100 \Omega$  load.
- d) What is stub matching in transmission lines?
- e) What is out of frequency in waveguide?
- f) Define the term : antenna gain and bandwidth.

**Q2)** Attempt the following.

- a) Explain cavity resonator and Q-factor of cavity resonator. **[7]**
- b) Explain the radiation principle in oscillating dipole. **[5]**

**Q3)** Attempt the following.

- a) What is smith chart? Write the characteristics and applications of smith chart. **[7]**
- b) Find the skin depth for copper at 10Hz and 100 Hz frequency. **[5]**  
[For copper,  $\mu = \mu_0$ ,  $\sigma = 5.8 \times 10^7$  s/m]

**P.T.O.**

**Q4)** Attempt the following:

- a) Derive the continuity equation. Write the significance of Maxwell's equations in wave propagation. [7]
- b) Derive the relation between VSWR and voltage reflection coefficient  $\rho_v$ . [5]

**Q5)** Attempt the following.

- a) Explain the boundary conditions at the interface separating two medium in electromagnetic wave propagation. [7]
- b) Explain role of an antenna in exciting TE and TM modes on waveguide. [5]

**Q6)** Attempt of the following.

- a) Explain magnetron oscillator with reference to construction, working and applications. [7]
- b) Write a note on optical fiber. [5]

**Q7)** Attempt any two of the following.

- a) Explain the cavity resonator. [6]
- b) Write a note on TE and TM mode of waveguide. [6]
- c) What is microstripline? What are different types of microstriplines? Write its applications. [6]



Total No. of Questions : 7]

SEAT No. :

P-2611

[Total No. of Pages : 3

[6071]-212

M.Sc. (Part - I)

ELECTRONIC SCIENCE

**ELUT-122 : Instrumentation And Measurement Techniques  
(2019 Pattern) (Semester - II) (Credit System)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*
- 4) *Neat diagrams must be drawn whenever necessary.*
- 5) *Use of non-programmable calculator is allowed.*

**Q1) Solve any five of the following :**

**[10]**

- a) State different types of strain gauges.
- b) What is Resolution?
- c) Draw equivalent circuits of piezoelectric transducer.
- d) Give classification of instruments.
- e) Enlist advantages of potentiometer transducer.
- f) "Measurements by direct method are not always possible". Comment.

**Q2) Answer the following :**

- a) Discuss generalized instrumentation system with block diagram. [7]
- b) An experiment is conducted to calibrate a copper-constant thermocouple. With cold junction at 0°, emf obtained at boiling point of water (100°C) and boiling point of sulfur (445°C) are 5 mV and 25 mV respectively. If the relation is assumed to be  $e - t_1 - t_2 = a(t_1 - t_2) + b(t_1^2 - t_2^2)$  [5]
  - i) Determine constants a and b.
  - ii) The above thermocouple indicates 2 mV with the cold junction at 40°C. Determine the unknown hot junction temperature.

**P.T.O.**

**Q3) Answer the following :**

- a) What are strain gauges? Derive the expression for gauge factor. [7]
- b) Derive the first order electrical system gives the output voltage,  $e_0 = Ei[1 - \exp(-t/\tau)]$ . [5]

**Q4) Answer the following :**

- a) Describe the construction and working of thermocouple. Discuss any two methods of measurement of their output voltage. [7]
- b) The output of an LVDT is connected to a 5V voltmeter through an amplifier whose amplification factor is 250. An output of 2mV appears across the terminals of LVDT when the core moves through a distance of 0.5 mm. Calculate the sensitivity of the LVDT and that of the whole set up. The millivoltmeter scale has 100 divisions. The scale can be read to 1/5 of a division. Calculate the resolution of the instrument in mm. [5]

**Q5) Answer the following :**

- a) What is loading effect? Describe the loading effect due to shunt connected instrument. How loading effect is minimized in above case? [7]
- b) Write difference between static characteristics and dynamic characteristics. Define following terms : [5]
  - i) True value
  - ii) Accuracy
  - iii) Standard Deviation

**Q6) Answer the following :**

- a) With neat diagram explain construction and working of LVDT. State applications of it. [7]
- b) What is relative limiting error in measurement. A 0-150V voltmeter has a guaranteed accuracy of 1 percent of full scale reading. The voltage measured by this instrument is 75V. Calculate percentage relative limiting error. Comment upon the result. [5]

**Q7) Write short notes on any two of the following :**

**[12]**

- a) Null type instrument
- b) Ultrasonic flow meter
- c) Thermistors



Total No. of Questions : 7]

SEAT No. :

**P2612**

[Total No. of Pages : 2

[6071]-213

**M.Sc. - I**

**ELECTRONIC SCIENCE**

**ELUT-123 : Foundation of Semiconductor Devices**

**(2019 Pattern) (CBCS) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Q.1 is compulsory.*
- 2) *Solve any Five questions from Q.2 to Q.7.*
- 3) *Questions 2 to Q.7 carry equal marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of non programmable calculator is allowed.*

**Q1)** Solve any five of the following :

**[10]**

- a) What are the advantage of Unipolar transistor over bipolar transistor?
- b) Define mass action law.
- c) The Lattice constant of a simple cubic cell is  $5.63 \text{ \AA}$ . Calculate distance between the nearest (100) plane.
- d) Draw band and bond structure of P type of semiconductor material.
- e) What do you mean by binary compound semiconductor? Give example.
- f) For JFET  $V_{GS} = -3V$ ,  $V_p = -6V$  and  $I_{DSS} = 10 \text{ mA}$  Calculate  $I_D$ .

**Q2)** Attempt the following questions :

- a) Describe the lattice structure of Simple Cubic (SC) Body centered Cubic (BCC) and Face Centered Cubic (FCC). Find out packing fraction of SC, BCC and FCC. **[7]**
- b) Explain Eber Moll model for NPN BJT. **[5]**

**Q3)** Attempt the following questions :

- a) Explain energy band diagram in MOS capacitor with n type substrate in Accumulation, Depletion and Inversion mode. **[7]**

**P.T.O.**

- b) Draw diagram indicating the Fermi Dirac distribution function for [5]
- i) Intrinsic Semiconductor.
  - ii) n type semiconductor.
  - iii) P type semiconductor.

**Q4)** Attempt the following questions :

- a) Derive Schrodinger time independent and time dependant wave equation. [7]
- b) A current of 50A is established in a slab of copper that is 0.5 cm thick and 2 cm wide. The slab is placed in a magnetic field  $\beta$  of 1.5T. The magnetic field is perpendicular to the plane of the slab and to the current. The Free electron concentration in Cu is  $8.4 \times 10^{28} \text{ m}^{-3}$ . What will be the magnitude of the Hall voltage across the width of the slab? [5]

**Q5)** Attempt the following question :

- a) Explain substitutional and interstitial defect using suitable sketches. [7]
- b) Explain the working of HBT. [5]

**Q6)** Attempt the following questions :

- a) Using Fermi-Dirac distribution function, obtain an expression for concentration of electron in conduction band and hole in valance band of semi conductor. [7]
- b) Explain the construction and operation of a MESFET. [5]

**Q7)** Write short notes on any two of the following : [12]

- a) Effect of temperature on mobility of carriers.
- b) Types of bond in solid.
- c) Hall effect. Derive relation for Hall coefficient.



Total No. of Questions : 5]

SEAT No. :

**P2613**

[Total No. of Pages : 4

[6071]-214

M.Sc. -I

**ELECTRONIC SCIENCE**

**ELDT-124 : Fiber Optic Communication Systems  
(2019 Pattern) (CBCS) (Semester - II) (Paper-IV)**

*Time : 2 Hours]*

*[Max. Marks : 35*

*Instructions to the candidates:*

- 1) *Q. 1 is compulsory.*
- 2) *Solve any three questions from Q.No.2 to Q.No.5.*
- 3) *Q.2 to Q.5 carry equal marks.*

**Q1)** Solve any Five of the following.

**[5]**

- a) List the three functional types of optical amplifiers.
- b) Define attenuation in fiber.
- c) What is an optical switch?
- d) List the four basic elements that contributes to the rise time.
- e) Mention the three types of optical couplers.
- f) What is a fiber Bragg grating.

**Q2)** Answer the following:

- a) i) What is an optical add/drop multiplexer in fiber optic cable? State advantages of OADM. **[2]**
- ii) Explain the process of measurement of attenuation in optical fiber cable. **[4]**
- b) Explain the working of Optical Time Domain Reflectometer (OTDR). **[4]**

**Q3)** Answer the following:

- a) i) Mention any two names of lasers and their main use with respect to medical field. **[2]**
- ii) Describe the working of optical amplifier. **[4]**

**P.T.O.**

- b) For a multimode fiber following parameters are recorded. LED with drive circuit has rise time of 15ns. LED spectral width=40nm, Material Dispersion related rise time degradation=21ns over 6km link, receiver band width = 25 MHz, modal dispersion rise time=3.9nsec, calculate system rise time. [4]

**Q4)** Answer the following:

- a) i) What is dispersion in optical fiber? List the methods of dispersion.[2]  
ii) Explain the concept of integrated optics. [4]
- b) Design an optical fiber link for transmitting 30 Mb/Sec of data for distance of 8km with BER of  $10^{-9}$ . [4]

**Q5)** Write a short note on any four of the following: [4×2.5=10]

- a) Rise time budget  
b) Raman amplifier.  
c) Optical Isolators.  
d) Optical power meter.  
e) Laser welding.  
f) Line coding in optical links.



Total No. of Questions : 5]

**P2613**

**[6071]-214**

**M.Sc.-I**

**ELECTRONIC SCIENCE**

**ELDT-124 : Fundamentals and Applications for AVR Micro Controller  
(2019 Pattern) (CBCS) (Semester - II) (92215)**

*Time : 2 Hours]*

*[Max. Marks : 35*

*Instructions to the candidates:*

- 1) *Q.1 is compulsory.*
- 2) *Solve any Three questions from Q.2 to Q.5.*
- 3) *Q.2 to Q.5 carry equal marks.*

**Q1)** Attempt any five of the following: **[5]**

- a) Write the pin function of SCL and SDA pins of AVR (AT mega 16) micro controller.
- b) Which flag bit of status register updated when SEH and CLH instruction executed in AVR microcontroller.
- c) State the bit capacity of timer registers present in AVR (AT mega 16).
- d) What memory address is assigned to timer 0, timer 1 & timer 2 overflow interrupt in the interrupt vector table?
- e) State the function of the SQW/OUT pin of the DS1307 real time clock.
- f) Find the step angle if stepper motor needs 200 steps to complete one revolution?

**Q2)** Answer the following:

- a)
  - i) Write assembly language program to get the status of switch is connected to PBO and send it to LED connected to PBT. **[2]**
  - ii) Draw and explain the DAC interfacing diagram with AVR micro controller and write 'c' program to generate square wave. **[4]**
- b) Draw the status register format and explain each Flag bit in detail of AVR micro controller. **[4]**

**Q3)** Answer the following:

- a) i) What is the content of R21 and status flag register after execution of following instruction. [2]  
LDI R21, 0xFF  
LDI R22, 0x01  
ADD R21, R22
- ii) For 10-bit ADC have  $V_{ref}=5V$ . calculate the  $D_0$ - $D_9$  digital output if the analog input is 1) 0.8V 2) 1.8v [4]
- b) Draw and explain architecture block diagram of AVR (AT Mega 16) micro controller. [4]

**Q4)** Answer the following:

- a) i) What are the types of addressing modes? [2]  
ii) What are the types of seven segment display? And draw and explain interfacing of seven segment display with AVR micro controller.[4]
- b) Write an AVR 'C' program to convert ASCII digits of '4' and '7' to packed BCD and display them on PORT B. [4]

**Q5)** Write short notes on any four of the following: [4×2.5=10]

- a) Timer/Counter control register (TCCR)
- b) Data memory of AVR micro controller.
- c) Features of AVR micro controller.
- d) The X-register, Y-register & Z-register of AVR micro controller.
- e) Modes of I<sup>2</sup>C (Inter-integrated circuit) serial protocol.
- f) Real Time Clock (RTC) DS1307 module.



Total No. of Questions : 7]

SEAT No. :

P-2614

[Total No. of Pages : 2

**[6071]-311**  
**M.Sc. (Part-II)**  
**ELECTRONIC SCIENCE**  
**ELT231 : Advanced Communication Systems**  
**(2019 Pattern) (Semester - III) (CBCS) (Credit-4)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates :*

- 1) *Q.1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*

**Q1)** Solve any five of the following. **[10]**

- a) State kepler's III<sup>rd</sup> Law.
- b) Define the term modulation.
- c) What will be output of balanced modulator?
- d) State one application of space wave propagation.
- e) A 50 kw carrier is to be modulated to a level of 80% What is the total side band power in this case.
- f) Write a short note on EBCDIC code.

**Q2)** Attempt the following.

- a) State SDLC protocol with appropriate frame format explain function of each block in detail. **[7]**
- b) Draw Block diagram of electronic communication system state function of each block in brief. **[5]**

**Q3)** Attempt the following

- a) Discuss smart Antenna concept in detail write benefits, advantages & disadvantages of smart Antenna. **[7]**
- b) Draw block diagram of micro wave transmitter and receiver and explain it's working. **[5]**

*P.T.O.*

**Q4)** Attempt the following.

- a) With the help of diagram explain the working of adaptive delta modulation and write advantages & disadvantages. [7]
- b) The maximum peak to peak voltage of an AM wave is 12mv & the minimum voltage is 4mv. calculate the modulation factor. [5]

**Q5)** Attempt the following.

- a) Explain microwave antenna and wide band antenna in detail. [7]
- b) Describe satellite multiple access technique. [5]

**Q6)** Attempt the following.

- a) What is PCM? With the help of block diagram and wave form explain in detail. [7]
- b) Explain External & internal noise. [5]

**Q7)** Write a short note on any two of the following.

- a) GPRS [6]
- b) QAM [6]
- c) Cellular radio system [6]



Total No. of Questions : 7]

SEAT No. :

**P2615**

[Total No. of Pages : 2

[6071]-312

M.S.c.-II

**ELECTRONIC SCIENCE**

**ELT -232 : Mechatronics and Robotics**

**(2019 Pattern) (Semester - III) ( (Credit-4) (Theory)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Figures to the right indicates full marks.*
- 4) *Neat diagram must be drawn wherever necessary.*

**Q1)** Attempt any five of the following:

**[5×2=10]**

- a) Why 'sensor' is primary element of control system?
- b) What are industrial applications of tactile sensors?
- c) What are basic building blocks of mechanical systems?
- d) What is the difference in transient response of a control system and steady response of control system?
- e) What is role of mechanism in mechatronic systems?
- f) What is link?

**Q2)** Attempt the following:

- a) i) What is encoder? Explain in brief. **[3]**
- ii) What is dashpots in mechanical system? **[4]**
- b) Write a short note on freedom & constraints. **[5]**

**Q3)** Attempt the following:

- a) i) Explain the working of DC motor. **[3]**
- ii) Write a short note on solenoid. **[4]**
- b) What are the basic building blocks of rotational system? Explain in brief. **[5]**

**P.T.O.**

**Q4)** Attempt the following:

- a) i) Explain the first order system. [3]
- ii) Explain the working of brush type dc motor. [4]
- b) Explain the working of BJTs & MOSFETs as switches [5]

**Q5)** Attempt the following:

- a) i) What is trajectory interpolation? Explain. [3]
- ii) What are the specifications of stepper motor? [4]
- b) Explain the working of synchronous motor. [5]

**Q6)** Attempt the following:

- a) i) Explain the construction & working of thyristor. [3]
- ii) Explain the working of second order system. [4]
- b) What are three main types of sensors for force feedback? Explain. [5]

**Q7)** Attempt any two of the following: [12]

- a) What is rotational and translation motion? Write a short note on composition of rotations.
- b) Write a short note on cams.
- c) Write a short note on : Roll-pitch-yaw representation.



Total No. of Questions : 7]

SEAT No. :

P-2616

[Total No. of Pages : 2

[6071]-313

**M.Sc. (Part - II) (Semester - III)**

**ELECTRONIC SCIENCE**

**ELT-233 : Control Systems**

**(2019 Pattern) (CBCS)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Question 1 is compulsory.*
- 2) *Solve any five question from Q2 to Q7.*
- 3) *Figures to the right indicate full marks.*
- 4) *Q.2 to Q.7 carry equal marks.*
- 5) *Neat diagrams must be drawn wherever necessary.*

**Q1)** Solve any five of the following.

**[10]**

- a) List components of SCADA.
- b) Sketch the output of PD controller for a step input.
- c) Write principle of control valves.
- d) What is closed loop control system? Give example of it.
- e) How solenoids are classified?
- f) Determine transfer function of low pass Filter (RC)

**Q2)** Attempt the following.

- a) With the help of block diagram explain room temperature control system. **[7]**
- b) Determine the range of K for stability of unity feed back system whose

open loop transfer function is  $G(S) = \frac{K}{S(S+1)(S+2)}$  **[5]**

**Q3)** Attempt the following.

- a) Explain the concept of gain margin and phase margin. Explain how these values help in studying stability of Bode plot. **[7]**
- b) Elaborate the statement 'Evolution of process control has been from manual to computer to network control. **[5]**

**P.T.O.**

**Q4)** Attempt the following.

- a) Explain feed forward & adaptive control system with suitable example. [7]
- b) Explain the concept of stability with suitable examples predict stability of control system from location of it's closed loop poles in the s-plane. [5]

**Q5)** Attempt the following.

- a) Define root locus for a control system consider control system with

$$G(S)H(S) = \frac{K}{S(S+2)} \text{ obtain the nature of root.} \quad [7]$$

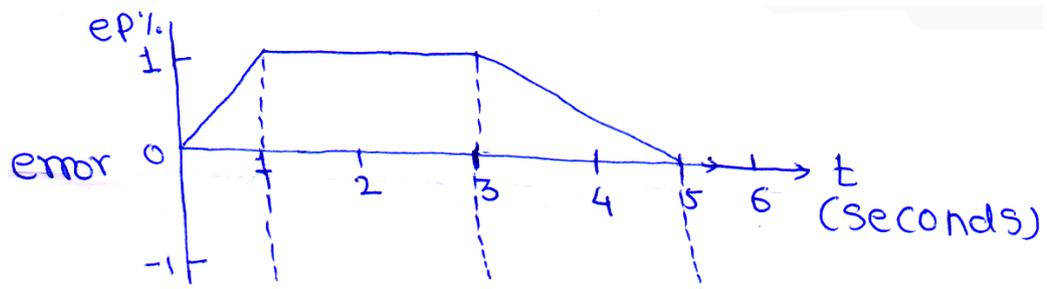
- b) Explain application of control system for speed control of dc motor. [5]

**Q6)** Attempt the following.

- a) Find the stability of control system having characteristics equation (use routh criteria) [7]

$$F(S) = S^5 + 3S^4 + S^3 + 3S^2 + S + 3 = 0$$

- b) Draw a graph of PD controller output as a function of time  $K_p = 5$ ,  $K_D = 0.5S$ , and  $P_o = 20\%$  when input in the following form [5]



**Q7)** Write short notes on any two of the following.

- a) Direct digital control [6]
- b) Zeigler Nichols method for process Loop tuning. [6]
- c) Solenoid [6]



Total No. of Questions : 5]

SEAT No. :

P-2617

[Total No. of Pages : 4

[6071]-314

M.Sc. (Part - II)

ELT234 : ELECTRONIC SCIENCE

Wireless Communication System - I

(2019 Pattern) (Semester - III) (Credit - 2)

*Time : 2 Hours]*

*[Max. Marks : 35*

*Instructions to the candidates:*

- 1) *Question 1 is compulsory.*
- 2) *Question 2 to Q.5 carry equal marks.*
- 3) *Solve any three questions from Q.2 to Q.5.*

**Q1) Answer any Five :**

**[5]**

- a) What is the full form of RFID? **[1]**
- b) What is the full form of WLL? **[1]**
- c) What is the full form of CDMA? **[1]**
- d) What is the full form of GSM? **[1]**
- e) What is the full form of GPRS? **[1]**
- f) What is the full form of WLAN? **[1]**

**Q2) a) Explain GPRS system architecture in details.**

**[6]**

- b) Explain the need of wireless networks as compare to Wire Networks. **[4]**

**Q3) a) Write note on:**

- i) Cordless phone **[3]**
- ii) Paging systems **[3]**
- b) Explain RAKE receiver in details. **[4]**

**P.T.O.**

- Q4)** a) Explain concept of spread spectrum. [6]  
b) Explain MIMO - OFDM System in details. [4]

**Q5) Write any four short notes :** [4 × 2½ = 10]

- a) 3G wireless networks
- b) 2G wireless networks
- c) CDMA 2000 Cellular Technology
- d) Soft hand off
- f) GSM speech coding



Total No. of Questions : 5]

**P-2617**

**[6071]-314**

**M.Sc. (Part - II)**

**ELT234 : ELECTRONIC SCIENCE**

**Fundamentals of Internet of Things (Elective theory Course)**

**(2019 Pattern) (Semester - III) (Credit - 2)**

*Time : 2 Hours]*

*[Max. Marks : 35*

*Instructions to the candidates:*

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*

**Q1) Solve any Five of the following :** **[5]**

- a) Define Network node.
- b) What is full form of EPCIS?
- c) What is the need of QOS in IoT?
- d) What is the main purpose of routing protocol?
- e) Define IoT
- f) What is device intelligence?

**Q2) a) i) Explain web of things.** **[2]**

ii) Draw and explain WSN Architecture. **[4]**

b) Explain working of RFID Tag. **[4]**

**Q3) a) i) What is the basic overview of IoT?** **[2]**

ii) What are different types of Nodes in WSN? Explain it in short. **[4]**

b) What are the basic requirement capability of IoT device? **[4]**

- Q4)** a) i) What is basic difference between barcode and RFID? [2]  
ii) What are the challenges or risks associated with IoT? [4]  
b) How satellite communication technology use in IoT? [4]

**Q5)** Short notes on any four of the following : [10]

- a) Data link layer protocol
- b) Integration Approaches
- c) Smart meter
- d) City Automation
- e) IoT Architecture
- f) Traffic characteristics



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

**P2619**

**[6071]-411**

**M.Sc.-II**

**ELECTRONIC SCIENCE**

**ELT - 241 : PLC Programming and Applications**

**(2019 CBCS Pattern) (Semester-IV)**

*Time : 2 Hours]*

*[Max. Marks : 35*

*Instructions to the candidates:*

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to Q.5 carry equal marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*

**Q1)** Solve any five of the following.

**[5]**

- a) What are the common type of PLC programming devices.
- b) List features of PLC.
- c) Draw symbol of examine IF open (XIO) instruction and explain its.
- d) List various PLC brand available in market.
- e) Define Scan cycle in PLC
- f) What is master control Reset (MCR) in PLC.

**Q2)** Attempt the following.

- a) Explain with the diagram sinking and sourcing concept in DC input modules of PLC. **[6]**
- b) Explain any four comparison instruction used in PLC. **[4]**

**Q3)** Attempt the following.

- a) Draw block diagram of PLC. Write Function of each block. **[6]**
- b) Draw ladder diagram for following logic gate **[4]**
  - i) OR
  - ii) NOR
  - iii) AND
  - iv) NAND

**P.T.O.**

**Q4)** Attempt the following:

- a) Explain the application of PLC in two way traffic light controller. Draw & explain ladder logic for traffic light controller. [6]
- b) With reference to PLC discrete output modules. [4]
  - i) What type of field out put devices are suitable for use with them?
  - ii) List three examples of discrete o/p (output) devices.

**Q5)** Write short notes on any four of the following. [10]

- a) HMI
- b) Latch instruction in PLC
- c) Analog to digital converter (ADC) module in PLC.
- d) Communication module in PLC
- e) Counters in PLC
- f) Memory organization in PLC.



Total No. of Questions : 7]

SEAT No. :

P-2620

[Total No. of Pages : 2

**[6071]-412**  
**M.Sc. (Part - II)**  
**ELECTRONIC SCIENCE**  
**ELT-243 : Technical Writing**  
**(2019 Pattern) (Semester - IV)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Question 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Question 2 to 7 carry equal marks.*
- 4) *Neat diagrams must be drawn whenever necessary.*

**Q1)** Solve any five of the following :

**[10]**

- a) What is technical communication?
- b) List three types of reading.
- c) What is mean by conference?
- d) Define authors.
- e) What is mean by interpersonal communication?
- f) Define critical thinking.

**Q2)** Solve the following ;

a) What is presentation strategies? Explain purpose of the presentation.

**[7]**

b) Describe key-note speech & Expert lecture in brief.

**[5]**

**Q3)** Solve the following :

a) What is barrier? Explain different types of barrier in brief.

**[7]**

b) Describe the flow of communication.

**[5]**

**P.T.O.**

**Q4)** Solve the following :

- a) What is mean by technical presentation? Explain in brief [7]
  - i) Class Room Presentation
  - ii) Individual Presentation
  - iii) Public Speaking
- b) What is report? Describe structure of report in brief. [5]

**Q5)** Solve the following :

- a) What is Thesis? Write structural point for making Thesis and explain each point in brief. [7]
- b) Describe the flow of communication. [5]

**Q6)** Solve the following :

- a) What is Interview? Write its purpose and sequence of Interviews. Explain in brief any two types. [7]
- b) Draw and explain process of communication. [5]

**Q7)** Write short notes on any two of the following. [12]

- a) Group discussion
- b) 7 C's of communication
- c) Paragraph

